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# In Situ SAXS and SANS Monitoring of Both Nanofillers and Polymer Chain Microstructure under Uniaxial Stretching in a Nanocomposite with a Controlled Anisotropic Structure

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We will show in this contribution how the combination of SANS and SAXS allows for a detailed monitoring of the respective evolutions of the structure of fillers by SAXS and conformation of polymeric chains by SANS under uniaxial stretching at various elongation ratios in a nanocomposite made of spherical magnetic nanoparticles of γFe2O3 dispersed in a matrix of polystyrene (PS) chains [1]. The chain conformation is directly obtained by SANS as we probed samples containing 25% PSH/75% PSD chains, taking benefit from the fact that the neutron scattering length density of PSD is similar to the one of γFe2O3 [2], while the structure of filler is directly probed by SAXS. We can make the structure of fillers in the nanocomposite before stretching very anisotropic thanks to the appliance of a magnetic field during the nanocomposite processing that induces the formation of nanoparticle chains aligned along the direction of the field, either parallel or perpendicular to the subsequent stretching. This gives rise to very anisotropic mechanical properties, and the structure of fillers evolves very differently [3].

[1] A.-S. Robbes, J. Jestin, F. Meneau, F. Dalmas, F. Boué, F. Cousin, Macromolecules, 2022, 55(15), 6876–6889.
[2] A.-S. Robbes, F. Cousin, F. Meneau, J. Jestin, Macromolecules, 2018, 51 (6), 2216–2226.
[3]A.-S. Robbes, F. Cousin, F. Meneau, F. Dalmas, F. Boué, J. Jestin, Macromolecules, 2011, 44(22), 8858–8865.

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